

# GSM/GPRS Shield with GPS Receiver PA6E-CAM

USER MANUAL

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## Overview

### **GSM/GPRS Shield with GPS Receiver PA6E-CAM**

This is a very low cost and simple Arduino GSM and GPRS shield. We use the module SIMCom SIM900A.

The Shield connects your Arduino to the internet using the GPRS wireless network. Just plug this module onto your Arduino board, plug in a SIM card from an operator offering GPRS coverage and follow a few simple instructions to start controlling your world through the internet. You can also make/receive voice calls (you will need an external speaker and microphone circuit) and send/receive SMS messages.

GPS module from GlobalTop: PA6E-CAM, based on MediaTek MT3333 chipset. Possibility of using both systems improves position accuracy and shortens cold start time, especially in difficult satellite signal conditions.

Module is pin-to-pin and functionally compatible to older PA6E module based on MT3329 chipset. Thus it is possible simple migration to this module without changing of printed boards.

## Features

### GSM/GPRS Shield Features

- Dual-Band GSM/GPRS 900/ 1800 MHz
- TTL data(RX, TX, GND).
- ESD Compliance.
- Power controlled using 29302WU IC.
- Enable with MIC and SPeaker socket.
- SMA connector with GSM Antenna
- SIM Card holder.
- Configurable baud rate
- Inbuilt Powerful TCP/IP protocol stack for internet data transfer over GPRS.
- High quality PCB FR4 Grade with FPT Certified.

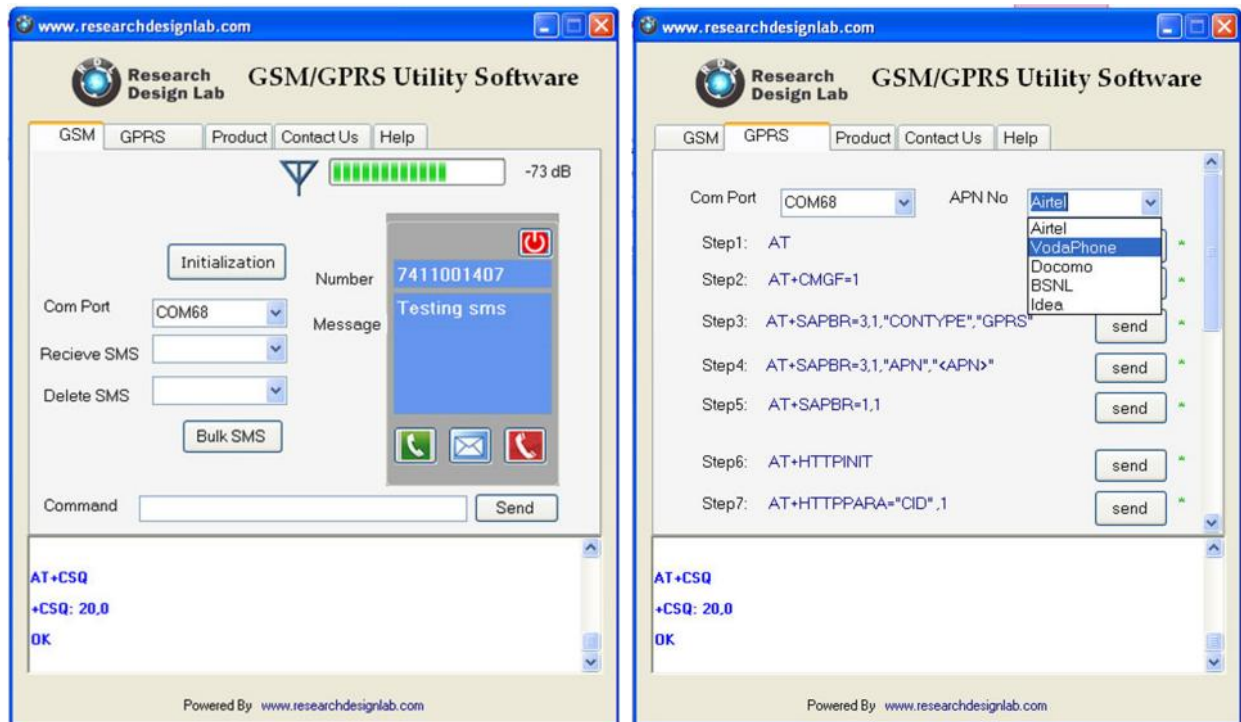
### GPS Receiver PA6E-CAM Features

- 33 tracking/ 99 acquisition-channel GPS receiver.
- Supports QZSS, SBAS(WAAS, EGNOS, MSAS, GAGAN\*) ranging.
- Ultra-High Sensitivity: -165dBm.
- High Update Rate: up to 10Hz(: SBAS can only be enabled when update rate is equal or less than to 5Hz.).
- 12 multi-tone active interference canceller(Some features need special firmware or command programmed by customer please refer to “PMTK Command List”)
- High accuracy 1-PPS timing support for Timing Applications ( $\pm 10$ ns RMS jitter).
- AGPS Support for Fast TTFF.

## Datasheets

- AT Commands datasheet  
<https://drive.google.com/a/researchdesignlab.com/file/d/0BzrGD4zr88GnTkJwSlI3dnhKbTg/edit?usp=sharing>
- FTP Commands datasheet  
<https://drive.google.com/a/researchdesignlab.com/file/d/0BzrGD4zr88GnVkhacjUtY2tIU2c/edit?usp=sharing>
- TCP/IP Commands datasheet  
<https://drive.google.com/a/researchdesignlab.com/file/d/0BzrGD4zr88GnUHCRCQIJwUjdWTVU/edit?usp=sharing>

## GSM Utility Software



- Bulk Message sending
- AT command testing terminal
- Provides step by step GPRS setup

To download GSM/GPRS Utility software ,click on the link below

- <https://docs.google.com/file/d/0BzrGD4zr88GnYll6dlFJT2NfY2s/edit>
- [http://www.4shared.com/file/rwyHmtGOba/GSM\\_GPRS\\_utility.html](http://www.4shared.com/file/rwyHmtGOba/GSM_GPRS_utility.html)



- **AT+CRC SET CELLULAR RESULT CODES FOR INCOMING CALL INDICATION:**

AT+CRC=? ↓

+CRC: (0-1)

OK

AT+CRC? ↓

+CRC: 0

OK

AT+CRC=1 ↓

OK

+CRING: VOICE

- **READ OPERATOR NAMES.**

AT+COPN=? ↓

OK

AT+COPN ↓

+COPN: "472001 ,"DHIMOBILE"

+COPN: "60500

+COPN: "502012 ,"maxis mobile"

+COPN:

+COPN: "502013 ,"TMTOUCH"

+COPN

+COPN: "502016 ,"DiGi"

+COPN: "502017 ,"TIMECel""

+COPN: "502019 ,"CELCOM GSM"

## **GPRS Commands:**

<u>Command</u>	<u>Description</u>
AT+CGATT ↓	ATTACH/DETACH FROM GPRS SERVICE
AT+CGDCONT ↓	DEFINE PDP CONTEXT
AT+CGQMIN ↓	QUALITY OF SERVICE PROFILE (MINIMUM ACCEPTABLE)
AT+CGQREQ ↓	QUALITY OF SERVICE PROFILE (REQUESTED)
AT+CGACT ↓	PDP CONTEXT ACTIVATE OR DEACTIVATE
AT+CGDATA ↓	ENTER DATA STATE
AT+CGPADDR ↓	SHOW PDP ADDRESS
AT+CGCLASS ↓	GPRS MOBILE STATION CLASS
AT+CGEREP ↓	CONTROL UNSOLICITED GPRS EVENT REPORTING
AT+CGREG ↓	NETWORK REGISTRATION STATUS
AT+CGSMS ↓	SELECT SERVICE FOR MO SMS MESSAGES
AT+CGCOUNT ↓	GPRS PACKET COUNTERS



## MODULE SETUP

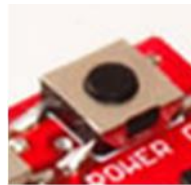
### For TESTING GSM/GPRS

step 1 : Insert SIMcard into the SIM slot.



step 2 : Plug in 12V -2A DC power adapter, power led is lit (place jumper in JP3,to turn ON automatically ).

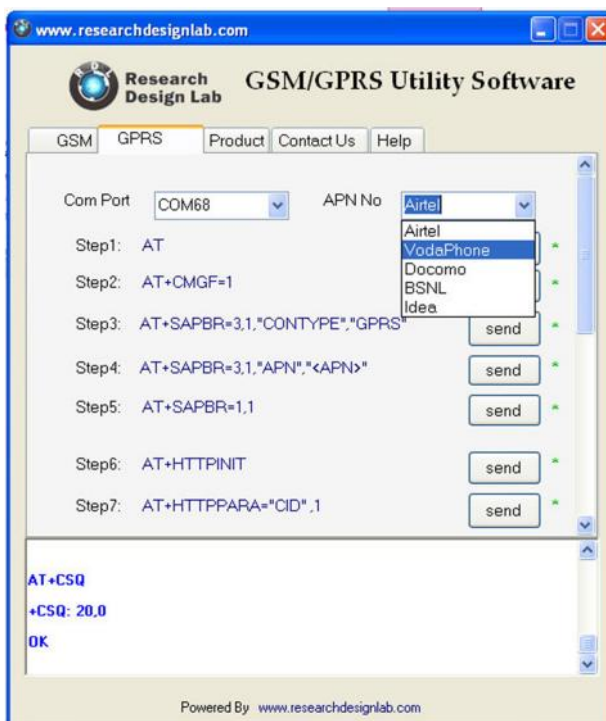
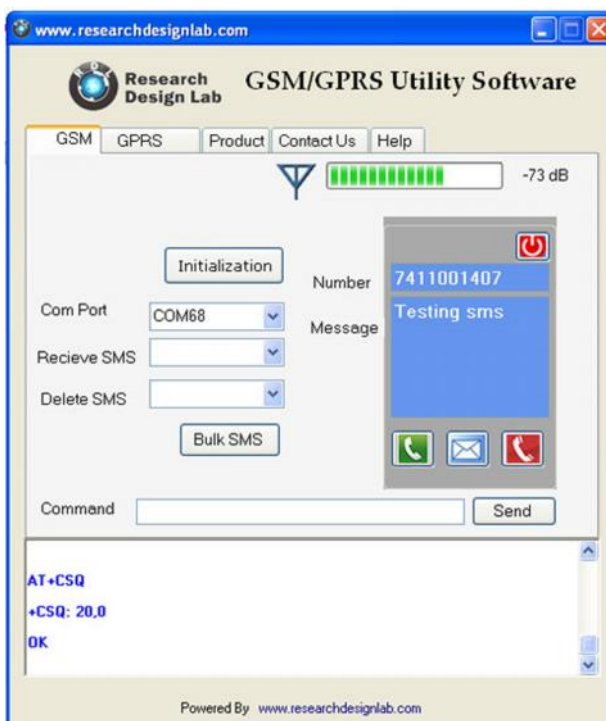
step 3 : Press and hold power button (To turn on manually without jumper)



step 4 : Connect to PC through TTL TO USB converter (connect RX(D0) and TX(D1))



step 5 : open GSM/GPRS utility software ,choose appropriate COM port and use AT commands listed in this manual for basic testing GPRS GSM/messaging and voice calling.



## FOR TESTING GPS

Step 1 : For GPS to work, Module should be placed in an open space until GPS locks on to minimum of 4 satellite .

Step 2 : Connect 5V and GND to the module

Step 3 : Connect D2(Soft RX) and D3(soft TX) of the GSM/GPS shield to PC through TTL to USB converter



Step 3 : Open serial window(Ex : hyper terminal) ,select the appropriate COM port ,baud rate 9600,then all the serial data from GPS will be displayed in the serial window.

## INDIVIDUAL ARDUINO TESTING CODES

### GPRS CODE

[http://researchdesignlab.com/projects/google\\_gprs.zip](http://researchdesignlab.com/projects/google_gprs.zip)

### GPS CODE

<http://researchdesignlab.com/projects/gps.zip>

Screen shots



```
=====
GPS
=====
Lat/Long: 12.872928,74.851478
Lat/Long: 12.872933,74.851470
Lat/Long: 12.872936,74.851463
Lat/Long: 12.872941,74.851448
Lat/Long: 12.872943,74.851440
Lat/Long: 12.872947,74.851440
Lat/Long: 12.872947,74.851429
Lat/Long: 12.872947,74.851432
Lat/Long: 12.872948,74.851432
```

### GPS\_GPRS\_PHP\_GOOGLE MAPS CODE

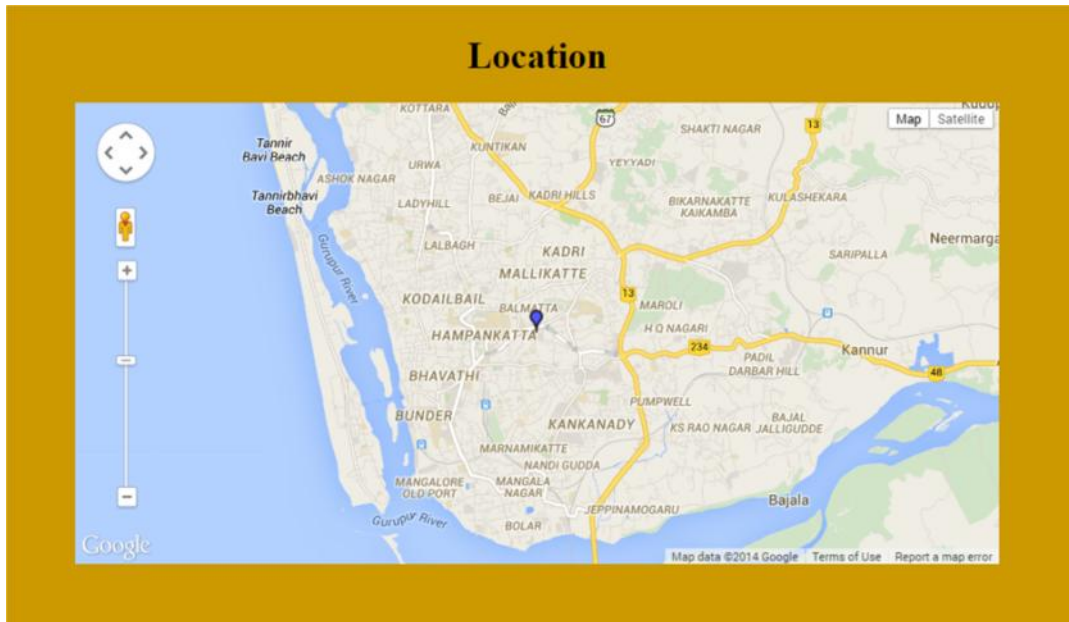
Uno code

[http://researchdesignlab.com/projects/uno\\_gps\\_tracking.zip](http://researchdesignlab.com/projects/uno_gps_tracking.zip)

PHP code

[http://researchdesignlab.com/projects/PHP\\_GPS\\_GPRS\\_Code.zip](http://researchdesignlab.com/projects/PHP_GPS_GPRS_Code.zip)

## Screen shots



12.872207	74.851081
12.872225	74.851089
12.872281	74.851135
12.872283	74.851142
12.872299	74.851165
12.872292	74.851165

## Data base

## POWER MODES

### Power down mode

SIM900A is set power down mode by “AT+CPOWD=0”

There are two methods for the module to enter into low current consumption status

### Minimum Functionality Mode

Minimum functionality mode reduces the functionality of the module to a minimum and thus minimizes the current consumption to the lowest level.

If SIM900A has been set to minimum functionality by “AT+CFUN=0”

If SIM900A has been set to full functionality by “AT+CFUN=1”

If SIM900A is set “AT+CFUN=4” to disable both the above functionality.

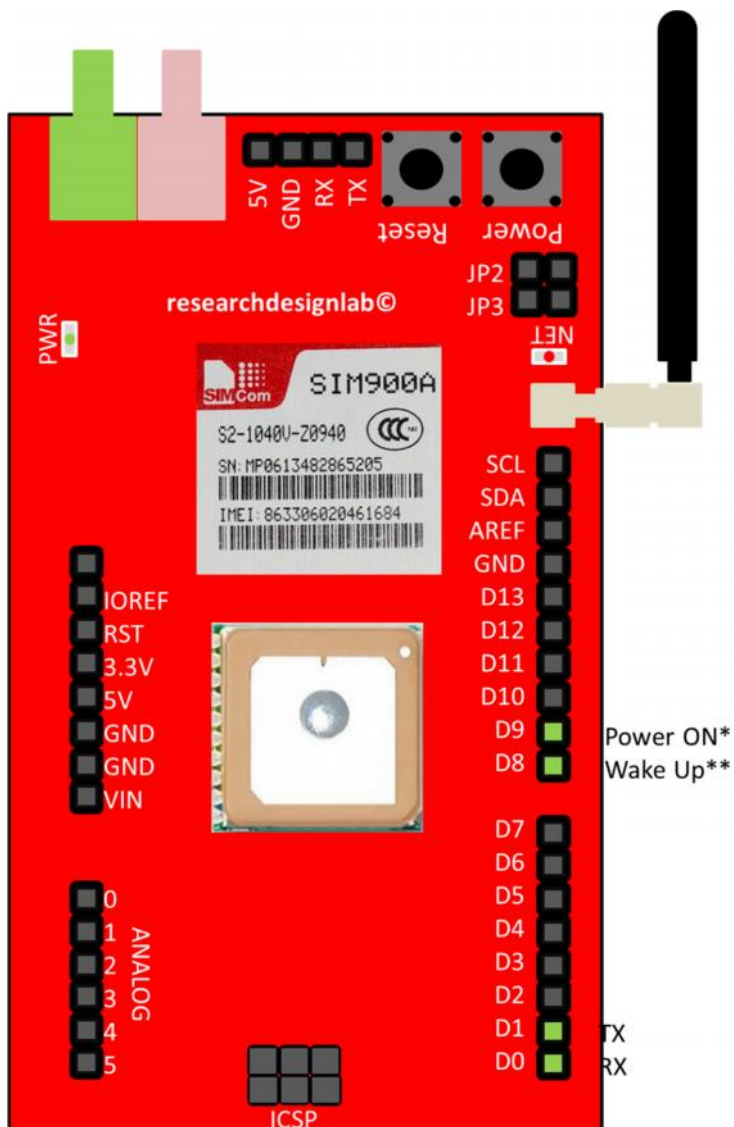
### Sleep mode

We can control SIM900A module to enter or exit the SLEEP mode in customer applications through DTR signal. When DTR is in high level and there is no on air and hardware interrupt (such as GPIO interrupt or data on serial port), SIM900A will enter SLEEP mode automatically. In this mode, SIM900A can still receive paging or SMS from network but the serial port is not accessible.

### Wake up SIM900A from sleep mode

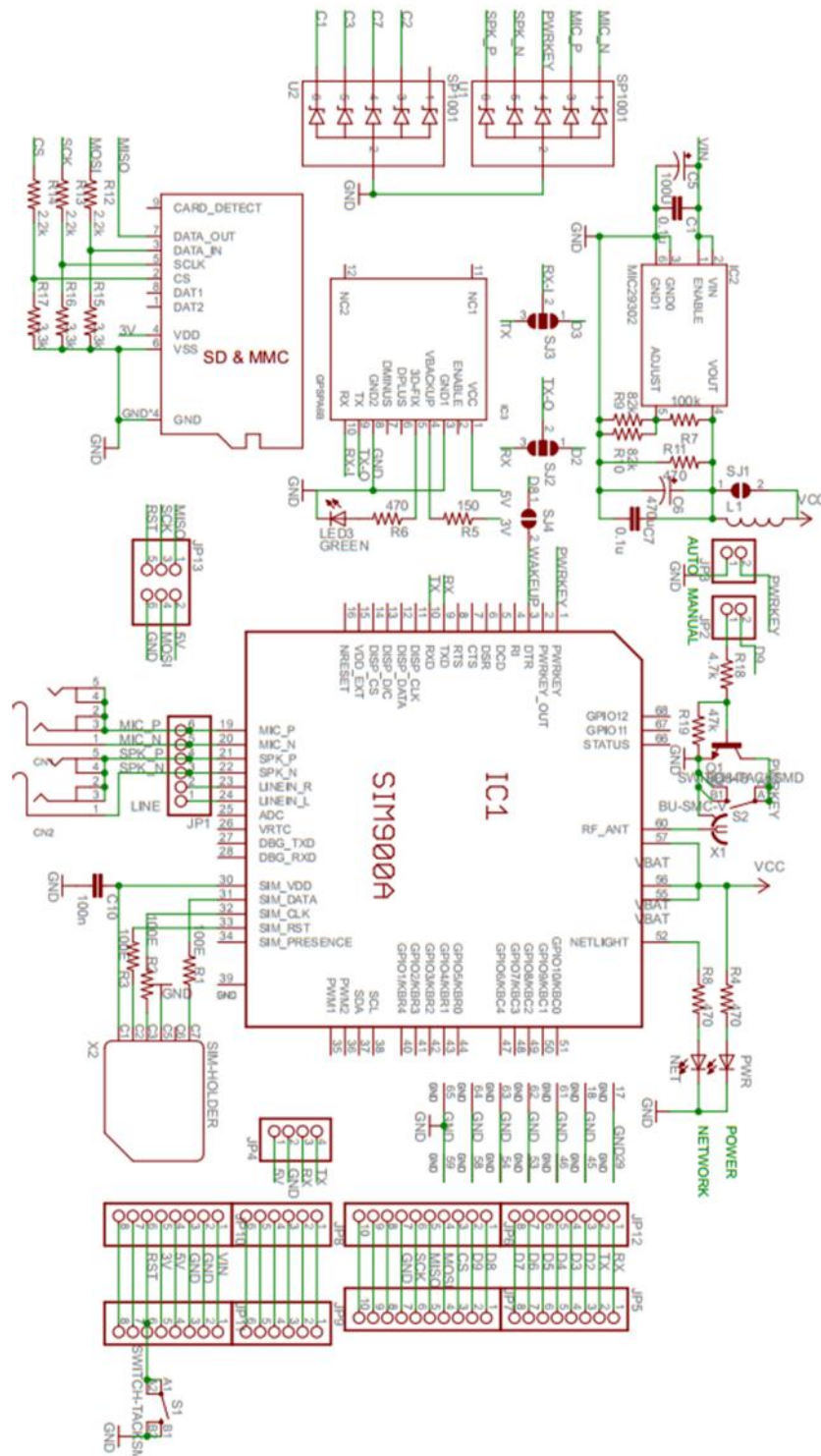
- Enable DTR pin to wake up SIM900A. If DTR pin is pulled down to a low level
- This signal will wake up SIM900A from power saving mode. The serial port will be active after DTR changed to low level for about 50ms.
- Receiving a voice or data call from network to wake up SIM900A.
- Receiving a SMS from network to wake up SIM900A.

## GSM/GPRS Shield with GPS Receiver PA6E-CAM





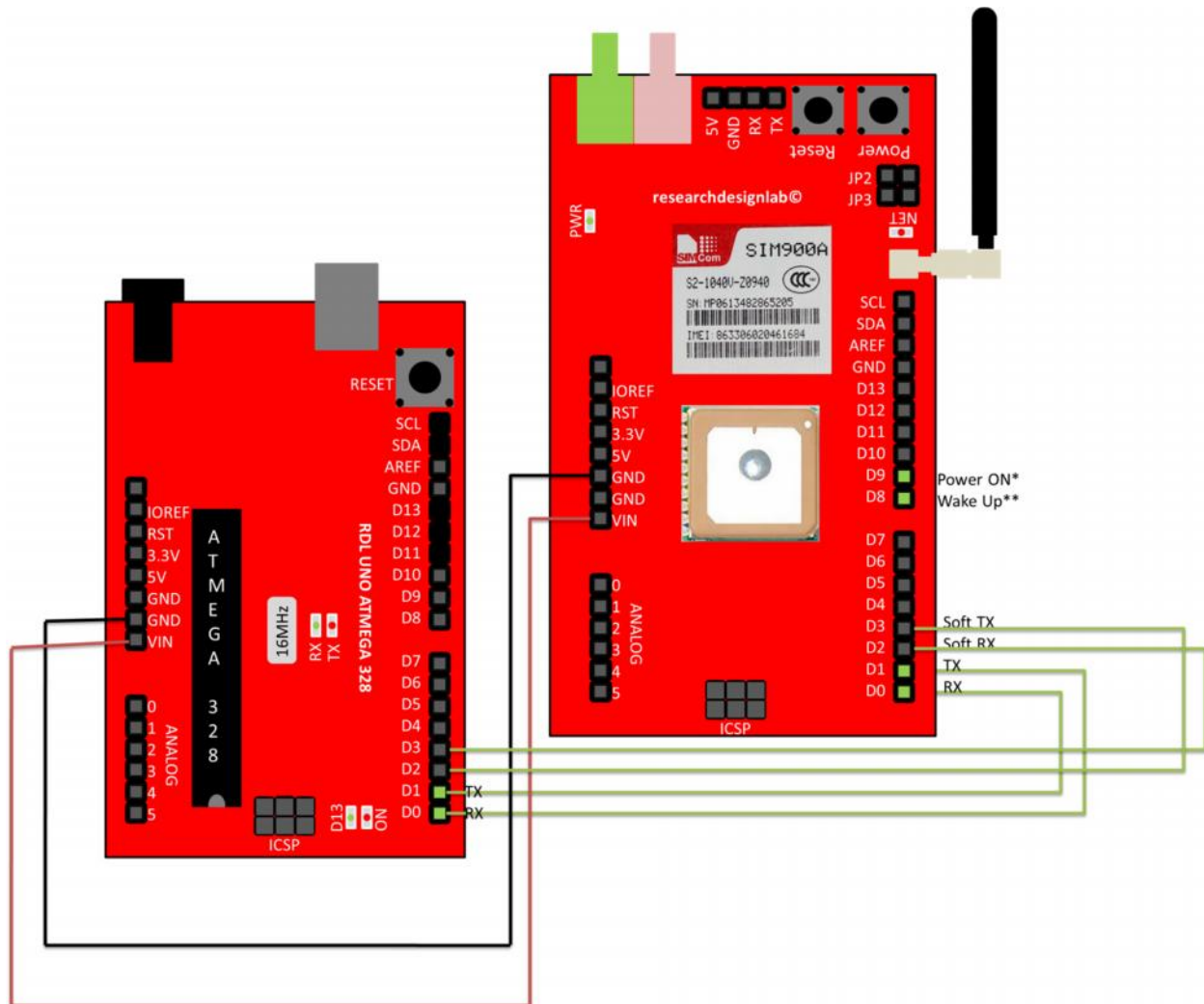
## CIRCUIT DIAGRAM





## BLOCK DIAGRAMS

### INTERFACING UNO AND GSM SHIELD



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## GSM SAMPLE CODES

### **ARM CODE**

<http://researchdesignlab.com/gsm-modem-arm-code>

### **ATEL CODE**

<http://researchdesignlab.com/gsm-modem-atmel-code>

### **PIC CODE**

<http://forum.researchdesignlab.com/GSM%20SIM900/PIC/SIM900.c>

### **ARDUNIO CODE**

<http://researchdesignlab.com/arduino-gsm2-code>

### **RASPBERRY PI CODE**

SENDING CODE

<http://researchdesignlab.com/gsm-raspberry-code>

RECEIVING CODE

<http://researchdesignlab.com/gsm-raspberry-receiving-code.html>

### **BEAGLEBONE CODE**

SENDING CODE

<http://researchdesignlab.com/gsm-beaglebone-send-code>

RECEIVING CODE

<http://researchdesignlab.com/gsm-beaglebone-receiving-code.html>

### **MSP430 CODE**

<http://forum.researchdesignlab.com/MSP430/MSP/GSM.zip>

### **GSM POWER SAVING ATEL CODE**

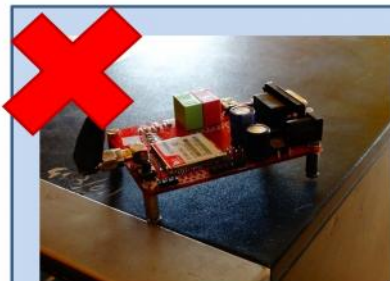
<http://researchdesignlab.com/gsm-power-atmel-code.html>

### **GSM POWER SAVING PIC CODE**

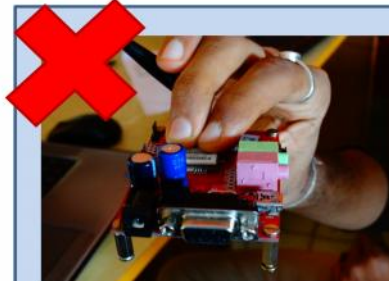
<http://researchdesignlab.com/gsm-power-pic-code.html>

## MODULE HANDLING

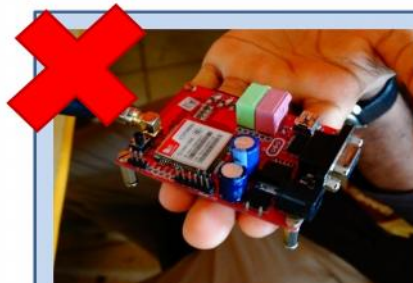
### DO'S AND DONT'S



Avoid placing circuit boards  
on a metal surface



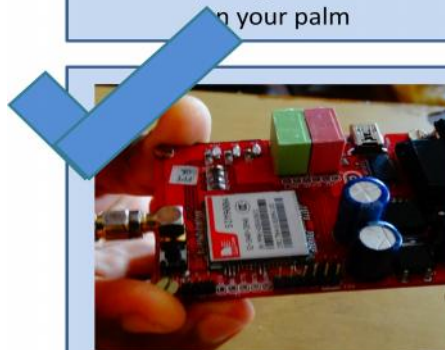
Avoid holding IC when  
switched ON



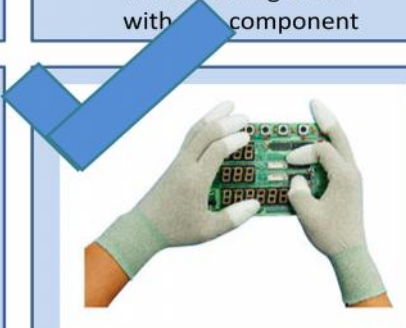
Avoid placing circuit boards  
on your palm



Avoid holding circuit  
with component



Hold edges while handling the  
circuit boards



If possible use anti static glove